

DATE: March 4, 2005
TO: Doug Howard, Regional Administrator

FROM: Clyde Lay, Senior Water Quality Analyst

SUBJECT: City of Paul – Wastewater Land Application Permit Application LA-000009-02 (Municipal Wastewater)

PURPOSE

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.04 for issuing wastewater land application permits. It states the principal facts and significant questions considered in preparing the draft permit conditions or the intent to deny, with a summary of the basis for the draft conditions or denial with references to applicable requirements and supporting materials.

PROCESS DESCRIPTION

The City of Paul operates a municipal wastewater treatment system serving residential and commercial users. The treatment system consists of a collection system, three facultative treatment lagoons, a chlorine contact basin, chlorination equipment, a pump station, and three land application sites, located approximately one mile east of the city. The land application sites are City Farm B, 27 acres, City Farm A, 48.5 acres, and the Harper Farm 87 acres. The City of Paul purchased City Farm A in April of 2004. A flow diagram for the city of Paul treatment system (Figure 1) and site map (Figure 2) are located in Appendix A. Wastewater enters the system from the sanitary sewer into a lift station at the lagoons. Wastewater is then pumped into either Lagoon 1 or Lagoon 2. Primary and secondary treatment is achieved by a two-stage facultative lagoon system. The lagoons consist of medium-depth cells (approximately 3 to 8 feet deep). They provide for continuous treatment of the wastewater through several physical and biochemical reactions, resulting in the removal of organics, nutrients and suspended solids. From either of these lagoons wastewater then flows into cell three for winter storage and final polishing. During the non-growing season the facultative lagoons may also serve as storage reservoirs. Following treatment in the facultative lagoons, effluent from Lagoon 3 gravity flows to a chlorine contact chamber and allowed to mix for approximately 30 minutes. After the chlorination facilities the effluent is pumped to the City Farms or is gravity fed to the Harper Farm. Flow to the individual land application sites is metered at separate locations located downstream from the chlorine contact basin. The meters are located such that wastewater volume and not mixed irrigation water volume is measured.

In 2003 the City of Paul finished a sewer improvement project replacing nearly all of the concrete sewer lines with PVC lines. The project was designed to reduce infiltration into the system by approximately 60%. Consequently, the wastewater volume requested in the current application is significantly less than the volume historically applied at the land application sites.

SUMMARY OF EVENTS

The City of Paul submitted a Wastewater Land Application Permit (hereafter WLAP) permit application on November 4, 1988. The WLAP permit LA-000077-01 was issued on February 28,

1989 and expired on January 31, 1994. On October 23, 2001 a WLAP Permit Renewal Application, WLAP (2001) prepared by Forsgen Associates, Inc. was received. An updated version of the WLAP (2004) Permit Renewal Application was provided April 6, 2004. The updated WLAP (2004) contains information concerning additional acreages (City Farm A) available for land application since WLAP 2001. As per IDAPA 58.01.17.400.01, the permit application was determined to be complete on May 20, 2004.

Site Inspections

On August 28, 2003 Olga Lutt from the Twin Falls's DEQ Regional Office inspected the site. Following were some of the comments incorporated with the inspection report (letter dated September 5, 2003 from Olga Lutt to the Honorable Randy Jones):

- According to operator buffer zone distances have been maintained between sprinkler irrigated areas and dwelling located adjacent to land application area;
- According to permit groundwater monitoring is required quarterly, first quarter of monitoring was missed.

On July 24, 2002 Olga Lutt from the Twin Falls's DEQ Regional Office inspected the site. Following were some of the comments incorporated with the inspection report (letter dated February 21, 2003 from Olga Lutt to the Honorable Randy Jones):

- Weekly hydraulic loading calculations should be included in future annual reports;
- A Sludge Management Plan should be prepared for DEQ review and approval prior to sludge removal from the lagoons;
- A Grazing Management Plan should be prepared for DEQ review and approval prior to allowing animals to graze the land application sites;
- A Buffer Zone Plan should be prepared and submitted to DEQ for review and approval. Included in the plan will be a timeline of implementation of existing buffer zones as required by the current permit.

SITE CHARACTERIZATION

The physical characteristics of the site are presented in the following sections. The site characterization consists of a description of the soils, the wastewater quality, and hydraulic loading rates. These characteristics will help determine the limiting factors of the site.

Soils

The land application site is located on soils primarily known as deep sand loams of Wodskow-Decker-Abo Associations. The soils at the new City Farm A include Abo loam, Abo loam saline,

and Declo loam. The available water capacity (AWC) for these soils ranges from 6 to 8 inches. The AWC for Declo loam ranges from 9 to 11 inches. The soils at City Farm B include similar soils with a greater percentage of Declo loam. The soils at the Harper Farm include Wodskow sandy loam, Decker fine sandy loam, and Abo sandy loam. These soils have AWC that ranges from 5 to 8 inches. This constitutes an adequate available water capacity for a wastewater land application. In addition these soils have only a slight hazard of water erosion (Hansen 1975).

No soil analysis was requested in the previous permit and consequently there is no data available to evaluate the soil efficiency to treat the City of Paul's wastewater.

DEQ recommends that soil analysis be completed during the new permit cycle. It is recommended that the following soil samples should be taken: collect 10 sub-samples for the first, second, and third foot of soil and composite the samples for three depths (one foot, two feet, and three feet), a total of 3 samples. The information will be used to document the adequacy of the soils for the harvest of various crops and for future permit applications.

Staff Recommends: The permittee should perform soil sampling and analysis at the wastewater land application site following permit approval and at the expiration of the new permit cycle.

Wastewater Quality

The previous permit required periodic wastewater quality monitoring. The parameters and frequency of monitoring included total flow (daily), total kjeldahl nitrogen (monthly), chlorides (monthly), nitrate (monthly) biological oxygen demand (monthly) and fecal coliform (weekly). These parameters were to be submitted in an annual report to DEQ. Based on the review of the annual reports it appears that the submittal frequency required in the existing permit was not adhered to by the city in the past. Loading rates and wastewater characteristics were also presented in the permit application. The average wastewater characteristics and constituent loading rates from the annual report data are presented in Table 1.

The loading rates were calculated using the average of reported discharges to the land application sites (22.76 MG and 32.87 MG for the City Farm B and Harper Farm, respectively) and 27 acres for the City Farm B site and 87 acres for the Harper Farm site. However, it should be noted that it appears from Geographic Information System and SPOT satellite imagery data that the Harper Farm acreage is much greater than the reported acreage in the WLAP permit application.

Table 1. Existing Constituent Concentrations and Loads.

Constituent ^a	Concentration/count	Existing Loading Rate ^b	
		City Farm B ^g	Harper farm ^h
BOD mg/L	15	0.5 lbs/acre/day ^c	0.2 lbs/acre/day ^c
COD mg/L	6.5 ^d	0.2 lbs/acre/day ^c	0.1 lbs/acre/day ^c
TDS mg/L	962 ^e	6,762 lbs/acre/yr	3,032 lbs/acre/yr
Total Nitrogen mg/L	6.65	46.74 lbs/acre/yr	20.96 lbs/acre/yr
Fecal Coliform colonies/100ml	158		
Total Phosphorus ^f mg/L	1.74	12.26 lbs/acre/yr	5.50 lbs/acre/yr

a BOD = Biological oxygen demand, COD = Chemical oxygen demand, TDS = Total dissolved solids.

b lbs/acre/day = pounds per acre per day, lbs/acre/yr = pound per acre per year.

c loading rate was calculated from pound per acre per year divided by the average number of days during the growing season or 214 days.

d three samples reported

e one sample reported

f sampling began in 1997

g 27 acres used to calculate existing loads

h 87 acres used to calculate existing loads

Proposed Loading Rates

The proposed loading rates from the WLAP application are in Table 2. These proposed loading rates were calculated using the 40.6 million gallons annually of projected treated effluent in the permit renewal application. In order to calculate the proposed loading rates an estimate of the acreage available for land application, after appropriate buffer zones were taken into account, was needed. Therefore, DEQ digitized the land application sites from SPOT satellite imagery using Arcview GIS software. From these digitized shapes, DEQ estimates that 35.6 total acres on City Farm A, 23.2 total acres on City Farm B, and 118.5 total acres on the Harper Farm. From the digitized shapes there is a total of 177.3 acres available for application of wastewater (Figure 3, appendix A) if appropriate buffers zones (based on the current disinfection rate of less than 23 cfu 100/ml) are incorporated into the individual land application sites (see buffer zones section of this document). Furthermore, 214 days are available during the growing season. Concentrations used to calculate the proposed loading rates are the average concentrations from previous sampling events or estimated concentrations when the constituent was infrequently reported in the case of TDS. In order to determine an estimated COD loading rate the following relationship was used:

COD (mg/L) = BOD (mg/L) * 2.4. The factor of 2.4 is based on the COD:BOD ratio for municipal wastewater ranging between 2.3 and 2.5:1 (Eddy and Metcalf, Eliassen et al. 1991).

Table 2. Proposed Loading Rates.

Discharge ^a	COD ^b	COD ^{bc} Loading Rate	Total Nitrogen	Total Nitrogen Loading Rate ^d	Total Phosphorus	Total Phosphorus Loading Rate ^d	TDS ^{be}	TDS Loading Rate ^d
40.6	35	0.31	6.65	12.70	1.74	3.33	400	764
MG	mg/L	lbs/acre/day	mg/L	lbs/acre	mg/L	lbs/acre	mg/L	lbs/acre

a Discharge units MG = million gallons per year.

b COD = chemical oxygen demand and TDS = total dissolved solids, units = mg/L = milligram per liter.

c COD loading rate was calculated from pound per acre (177.3 total acres) per year divided by the average number of days during the growing season or 214 days. This yields pounds per acre per day.

d Total Nitrogen, Total Phosphorus, and TDS loading rates were calculated from the product of concentration, discharge and 8.34 (a conversion from gallons to pounds) divided by the treatment acreage (177.3 acres). This yields pounds per acre per year.

e TDS concentration was estimated from typical municipal wastewater applications.

Maximum Hydraulic Loading Rates

The growing season for this land application is defined as the period between April 1 to October 31 (214 days). The non-growing season for this land application is defined as the period between November 1 and March 31 (151 days). The hydraulic maximum loading rates were calculated using these time periods.

Growing Season

The following equation was used for the hydraulic rate for the growing season:

$$IWR = [Cu - (PPTe + \text{carryover soil moisture}) + LR] / Ei.$$

IWR = irrigation water requirement.

Cu = crop consumptive use.

PPTe = effective precipitation.

LR = leaching rate

Ei = irrigation efficiency.

It was assumed that the carryover soil moisture for the growing season was zero. It was also assumed that the leaching rate was zero. Based on the information provided in the WLAP Permit Renewal Application, WLAP (April, 2004) prepared by Forsgen Associates, Inc. (Section 2 Available Wastewater Irrigation Capacity By Crop, page 4) crops grown on the sites will include alfalfa, grain, grass, potatoes, and sugar beets. It is assumed that appropriate crop rotation will be used. Site inspections indicate that alfalfa is currently being grown on the City Farm B, and Grain on City Farm A.

Using the Guidance for Land Application of Municipal and Industrial Wastewater (DEQ 2004), and other sources cited below, the irrigation water requirement for the various crops were calculated for the three land application sites (Table 3).

Table 3. Growing season hydraulic demand.

Crop	Cu ^a (in)	PPTe ^b (in)	Ei ^c (%)	IWR (in)	IWR (MG) TOTAL	IWR (MG) FARM A	IWR (MG) FARM B	IWR (MG) HARPER FARM
Alfalfa, hay	38.03	3.57	70	49.23	237.01	47.59	31.01	158.41
Wheat, spring	26.89	3.57	70	33.31	160.39	32.20	20.99	107.20
Potatoes	28.58	3.57	70	35.73	172.01	34.54	22.51	114.97
Sugar Beets	33.90	3.57	70	43.33	208.60	41.89	27.30	139.42

a – Estimating Consumptive Irrigation Requirements for Crops in Idaho, by R.G.Allen and C.E.Brockway, August 1983 (<http://www.kimberly.uidaho.edu/water/appndxet/index.shtml>)

b - Guidance for Land Application of Municipal and Industrial Wastewater (DEQ 2004), Appendix D-1, Station 106877 (Paul); annual PPT=5.10 inches, assumed that PPTe=70% of PPT

c - Guidance for Land Application of Municipal and Industrial Wastewater (DEQ 2004), Table 2 “Irrigation Application Efficiencies), page IV-7 (average efficiency for the wheel line sprinkler ranges between 60-80%)

d – The water volume calculation for the irrigation water requirement was done with the assumption that 177.3 total acres of irrigated land would be utilized (City Farm A 35.6 acres, City Farm B 23.2 acres, and Harper Farm 118.5 acres). The reduced acreage (177.3) was based upon a reduction of the total acreage to account for required buffer zones from private wells and dwellings.

The wastewater to the City of Paul land application sites averaged 55.63 MG and ranged from 34.08 to 80.60 MG per year between 1992 and 2003. The sites were permitted for land application to City Farm B and the Harper Farm in 1989, of up to 1.04 million gallons daily (Schedule A, Wastewater Treatment Limitations, Article 1, page 3 of 8) from March 2 to October 31 (Schedule C, Article 7).

From the evaluation of the calculated hydraulic rate, it appears that the maximum calculated irrigation water requirement for individual crops is well above the historic wastewater hydraulic loading rate.

The proposed hydraulic loading rate of 40.6 MG annually (see Table 2) is also significantly lower than the individual crop irrigation water requirement for the total available acreage (see Table 3). In order to ensure that a healthy crop is grown, for optimal nutrient uptake, the city should provide additional irrigation water to the land application sites.

Non-growing Season

The following equation was used for the hydraulic rate for the non-growing season:

$$\text{HLRngs} = [\text{AWC} + \text{E} - \text{PPTngs}] + \text{LR}.$$

HLRngs = hydraulic loading rate for the non-growing season.

AWC = available water capacity of the soil.

E = estimated evapotranspiration during the non-growing season. PPTngs = average precipitation for the non-growing season.

LR = leaching rate.

It was assumed that the leaching rate was zero. Available water content was derived from NRCS *Soil Survey of Minidoka Area, Idaho, Parts of Minidoka, Blaine, and Lincoln Counties* (Hansen 1975) for the dominant soil type (Abo sandy loam) of the land application site (Farm B). The Guidance for Land Application of Municipal and Industrial Wastewater (DEQ 2004) was used for the PPTngs. The estimated nongrowing season hydraulic loading, shown in Table 4, is approximately 12.93 inches, or 4.58 million gallons.

Table 4. Nongrowing season hydraulic loading.

Hydrologic Management Unit	Available Water Content (in)	E Average ^a (in)	PPTngs ^b (in)	HLRngs (in)	Total Acres	HLRngs (MG)
MU-1 (City Farm B)	6.5	4.86	4.49	6.87	23.2	6.64
MU-2 (City Farm A)	6.5	4.86	4.49	6.87	35.6	4.33
MU-3 (Harper Farm)	5.0	4.86	4.49	5.37	118.5	17.28

a – The average non-growing season evapotranspiration value of 4.86 inches was taken from a study conducted by the USDA-Agricultural Research Service in Kimberly, Idaho

b - <http://www.wrcc.dri.edu/summary/climsmid.html> Station 106877, Paul 1ENE.

Staff Recommends: The wastewater should not be land applied during winter months, except for emergency situations/events. For example nongrowing season irrigation may be allowed if available storage capacity in the lagoons is exceeded. Permission from DEQ must be obtained prior to nongrowing season application, and wastewater will be monitored monthly if land applied during the nongrowing season. Wastewater application during the nongrowing season shall not exceed the calculated nongrowing season hydraulic loading for each hydraulic management unit. Close monitoring of the hydraulic management unit will be required to avoid hydraulic overloading, ponding, or runoff.

MAXIMUM CONSTITUENT LOADING RATES AND CROP UPTAKE

Constituent loading rates for N, COD, and proposed growing season hydraulic loading rates should conform with the guidelines shown in the Guidance for Land Application of Municipal and Industrial Wastewater, page 41 (DEQ 2004). The maximum annual loading application of total nitrogen will be limited to 150% of the specific crop uptake, shown in Table 5.

Loading rates for total phosphorus should conform with the guidance set forth in the State of Idaho Guidance for Land Application of Municipal and Industrial Wastewater phosphorus loading rates, pages 54 through 56 (DEQ 2004).

To address surface water concerns the irrigation system should be design to achieve zero runoff of wastewater. The runoff controls shall be sufficient to contain storm event less than or equal to a 25 year 24 hour storm event. In addition site closure plans shall include consideration of accumulated phosphorus in the surface soils. Soil phosphorus, upon closure, must not pose a threat to surface waters as a result of future irrigation practices or lack of adequate runoff control structures.

To address ground water concerns IDEQ may request site-specific analysis, information, or other justification that indicates that there is no ground water interconnection to the surface water. Examples of alternative analysis can be found in the WLAP guidance and include ground water concentration limits, TMDL's developed for ground water, or soil phosphorus values measured in the 24"-36" soil depth level. Upon approval by DEQ, this alternate limit or approach may be incorporated into the permit or otherwise used as appropriate.

In the absence of any site-specific analysis and alternate limits or approaches approved by DEQ, a permit limitation for phosphorus loading should be considered at 125% of crop uptake.

Table 5. Crop uptake rates.

Crop	Average Yield Dry Mass ^a (Tons/Acre)	%N On Dry Mass Basis ^b	%P On Dry Mass Basis ^c	N (lb/ac/yr)	P (lb/ac/yr)	125%P (lb/ac/yr)	150%N (lb/ac/yr)
Alfalfa, grass hay	4.0 tons/acre	2.25	0.22	180.00	17.60	22.00	270.00
Wheat, spring	40 Bu./acre	2.08	0.62	49.92	14.88	18.60	74.88
Wheat Straw	1.5 tons/acre	0.67	0.07	20.10	2.10	2.63	30.15
Potatoes	14.5 tons/acre	0.33 ^d	0.06 ^d	95.70	17.40	21.75	143.55
Beets	20 tons/acre	0.20 ^d	0.03 ^d	80.00	12.00	15.00	120.00

a – Typical yields were taken from Agricultural Waste Management Field Handbook, Part 651, pages 6-19 to 6-22

b,c - %plant nutrient uptake were taken from Agricultural Waste Management Field Handbook, Part 651, pages 6-19 to 6-22

d % plant nutrient content based on wet weight basis.

Staff recommends: Perform soil sampling and testing to monitor Nitrogen and Phosphorus values and determine the Nitrogen and Phosphorus loading rates based on the wastewater used.

WASTEWATER QUALITY AND PROPOSED LOADING RATES

The proposed wastewater loading rates for the permit renewal are shown in Table 6. A comparison of the proposed wastewater loading values and the maximum allowed loading values in Table 5 indicates that total nitrogen and total phosphorus loadings appears to be much lower than crop uptake rates. The COD loading calculation shows that the proposed loadings are well below the DEQ guideline of 50 lb/ac-day. There was no requirement in the 1989 permit to monitor total dissolved solids (TDS) in the wastewater. The proposed TDS loading calculation is 764 lb/ac-yr that is based upon standard municipal wastewater concentration values (e.g. 400 mg/L TDS).

Staff recommends: Wastewater should be monitored for the following parameters: Total Kjeldahl nitrogen, Nitrate+Nitrite-Nitrogen, Total Dissolved Solids, Volatile Dissolved Solids, pH, Chemical Oxygen Demand (COD), Total Phosphorus, and Total Coliform. A monitoring frequency of monthly during application of wastewater should provide sufficient information to calculate historic loading rates for permit compliance and future iterations of this permit.

Table 6. Propose loading rates.

Parameter	Units	Historic loading Rates ^a	Proposed Wastewater Loading Rate	Maximum Total Loading Rate
Hydraulic Loading Rate	Million gallons	55.63	40.6 ^b	Up to Crop IWR ^c
Total Nitrogen	lbs/acre-year	27.06	12.33	150% of crop uptake
Total Phosphorus	lbs/acre-year	7.10	3.23	125% of crop uptake
TDS	lbs/acre-year	3,915	764	
BOD, annual average (365 days)	lbs/acre-day	2.24	1.02	
COD, GS average (214 days)	lbs/acre-day	0.28	0.13	50

a Based on average wastewater volume applied between 1992 and 2002 and average wastewater sample data.

b From WLAP permit application for renewal (May 2004).

c IWR = Crop irrigation water requirement.

GROUNDWATER

Three aquifers exist in the Paul area. The first of these is the shallow regional aquifer associated with high seasonal fluctuations and a proximity to the irrigation system, notably the Main Drain and irrigated farm land. Seasonal fluctuation of ground water level in this aquifer is common in the Paul area. During the summer sub-water may be within three to four feet of the surface while during the winter surface water may be between five to six feet (WLAP 2004). Regional flow direction of this shallow aquifer was noted to flow in a north/northeast direction away from the Main Drain (CH2M Hill 1992).

The second aquifer is the deep Snake River Plain Aquifer. Depth to this aquifer ranges from 60 feet to 250 feet depending on the location in and around Paul. The deep aquifer flows in a westerly direction, along a similar direction as the Snake River (Lindholm et al 1988).

The third aquifer is the inter-flow regions within the broken Snake River Plain Basalts. This aquifer is recharged from vertical migration from the shallow perched aquifer and from precipitation and infiltration in areas where exposed basalts exist near the surface (CH2M Hill 1992).

The direction of the groundwater flow is very important when establishing the groundwater monitoring network for the land application site, and in the evaluation of the possible impacts from the wastewater irrigation.

The Wastewater Land Application Permit for the city of Paul, issued on February 28, 1989, required quarterly groundwater monitoring from two monitoring wells and six piezometers. In the following year, 1990, two piezometers were discontinued due to a collapse or depth to groundwater issues. In 1993, two additional deep wells were added to the monitoring regime to replace the loss of the shallow piezometers. Monitoring data is currently available from four deep private wells and four shallow piezometers. With the purchase of City Farm A in April of 2004, west of the existing sites, the monitoring network may not provide the needed down gradient coverage needed to adequately address ground water impacts.

Staff Recommends: The permittee should submit to DEQ for review and approval a groundwater monitoring well network that provides for adequate coverage of the new City Farm A location as well as the historic land application sites. The groundwater monitoring wells should be sampled annually during the permit cycle for the following parameters: Nitrate nitrogen, Nitrite nitrogen TDS, Sodium, Chloride, Total Phosphorus, Total Iron, Total Manganese, pH, and static water level. A Groundwater Monitoring and Sample Handling Standard Operating Procedures section needs to be included with the O&M Manual and submitted to DEQ for review and approval. The standard

operating procedure section should address at minimum the decontamination of equipment prior to each use, well purging calculations and procedures, field records, sample collection and preservation, sample chain of custody.

BUFFER ZONES AND WELLHEAD PROTECTION

Current buffer zones associated with the land application site include distances of 300 and 500 feet from dwellings and private water sources, respectively. In addition, there is a 20 foot setback from the south boundary of City Farm B. There also is an earthen berm around the west boundary of the City Farm B land application site to retain any potential irrigation runoff from the site. Adherence to the buffer zone requirements have been minimal as the contracted farmer typically irrigates to the edge of the site (See buffer zone discussion in permit renewal document WLAP 2004).

Noncompliance with the previous permitted buffer zones ultimately led to the purchase of the new City Farm A.

City Farm A and City Farm B are adjacent to one another. Within the vicinity of these two sites there are two inhabited buildings, and one domestic well. Additionally, there are roadways between the sites (see appendix A Figure 3). Several homes, domestic wells, and roadways are near the Harper Farm(see appendix A Figure 3).

The buffer zone requirements specified in Table 11 of the Guidance for Land Application of Municipal and Industrial Wastewater (DEQ 2004) for a primary treatment facility with various levels of disinfection are shown in Table 7.

DEQ staff and city personnel have discussed buffer zones for the Paul land application site several times (June 5, 1997 letter to Honorable Randy Jones; July 21, 1997 letter to Honorable Randy Jones; July 24, 2002 site inspection; February 21, 2003 letter to Honorable Randy Jones; August 28, 2003 site inspection; May 20, 2004 Letter to Honorable Randy Jones; and June 25, 2004 letter to Honorable Randy Jones). The WLAP Renewal Application, WLAP (2004) prepared by Forsgren Associates, Inc. and submitted on April 6, 2004 indicates that the current disinfection rate is 23 organisms per 100 ml. As such, the buffer zone requirements specified in the Guidance for Land Application of Municipal and Industrial Wastewater are 300 feet from inhabited dwellings and 0 feet from areas accessible to the public, 50 feet from surface waters, 500 feet from private wells (100 feet following the completion of a well location acceptability analysis), and 1000 feet from public water sources. Also, fencing and posting will be required that should read "Sewage Effluent Application-Keep Out", or equivalent.

In order to meet the buffer zone requirements, without having to remove a significant portion of the existing irrigated acreage from the land application site one alternative is to provide a redundant disinfection system of the treated effluent to ensure that the disinfection rate is less than 2.2 organisms per 100 ml. The City anticipates that a redundant chlorination system will be designed

and constructed during the next permitting cycle to disinfect the treated effluent prior to land application (WLAP 2004).

Table 7. Buffer zone distance at various disinfection rates.

Disinfection Level*(total coliform)	Distance to Public Access (feet)	Distances to Inhabited Dwellings (feet)	Distance to intermittent surface water and canals (feet)	Distance to private water sources (feet)	Distance to public water sources (feet)	Single sample maximum total coliform level
No disinfection	1000	1000	50	1000	1000	TNC
<230/100ml	300	1000	50	500	1000	2400/100 ml
<23/100ml	0	300	50	500	1000	240/100 ml
<2.2/100ml	0	100	50	500	1000	23/100 ml

Upon completion of the redundant chlorination system, and assurance that the disinfection rate, through monitoring data, is maintained at levels less than 2.2 org/100 ml, the buffer zones could be addressed in a permit modification.

Also, based on the above referenced guidance, fencing and posting will be required. The signs should read “Irrigated with Reclaimed Wastewater – Do Not Drink”, or equivalent. The signs should be posted every 500 feet and at each corner along the outer perimeter of the buffer zones of the site.

Staff recommends: The current wastewater properties indicate that a disinfection rate of 23 org/100 ml is maintained. Total Coliform shall be monitored to provide assurance that this disinfection rate is still applicable to the system. If the current the level of disinfection is less than the reported rate the city should maintain the appropriate buffer zones (see Table 7) or cease application of wastewater until the level of disinfection complies with the permitted buffer zones. The redundant chlorination system should be a priority so that the city may use a greater proportion of the land application sites.

The buffer zone for the domestic well located adjacent to the City Farm B (permitted in 1989) land application site is 500 feet regardless of disinfection rate. However, the city may propose alternative buffer zones as found in the Wastewater Land Application Guidelines and the well location acceptability analysis [DEQ 2004 (see section 6.6, pages 81 through 90)]. To date the city has not proposed an alternative buffer zone nor completed a well location acceptability analysis.

SURFACE WATER CONSIDERATIONS AND FLOOD ZONES

The Main Drain is the only surface water located in the vicinity of the land application site. This water body is within 50 feet of the City Farm A (acquired in April of 2004) and Harper Farm (permitted in 1989) application sites (WLAP 2004) (see Appendix A, Figure 3).

Flood Zones are discussed in the Wastewater Land Application permit renewal document Section 2, figure 3. The U.S. Housing and Urban Development flood zone map for the area was reviewed. The land application site is not located within any 100-year flood plain.

Staff Recommends: The permittee should employ Best Management Practices (BMPs) to prevent applied wastewater and any runoff from entering the nearby irrigation drain. The BMPs should be included in the updated O&M Manual and submitted to DEQ for review and approved prior to implementation.

GRAZING

According to the Wastewater Land Application permit renewal document, submitted April 6, 2004, there will be no grazing at the wastewater land application site.

RECOMMENDATION

Staff recommends that the attached land application draft permit be issued, for the renewal of the City of Paul wastewater land application permit.

REFERENCES

CH2M Hill. 1992. Land Application Report for Mini-Cassia Facility. Boise, ID.

DEQ. 2004. Guidance for Land Application of Municipal and Industrial Wastewater. Department of Environmental Quality, Boise ID.

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WLAP 2001. City of Paul Wastewater Land Application Permit Renewal Application. Forsgren Associates, Inc, Rexburg ID .

WLAP 2004. City of Paul Wastewater Land Application Permit Renewal Application. Forsgren Associates, Inc, Rexburg ID .

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Richard Huddleston, State Water Quality Office
Source file WLAP LA-000009-02 (TFRO&SO)

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Appendix A

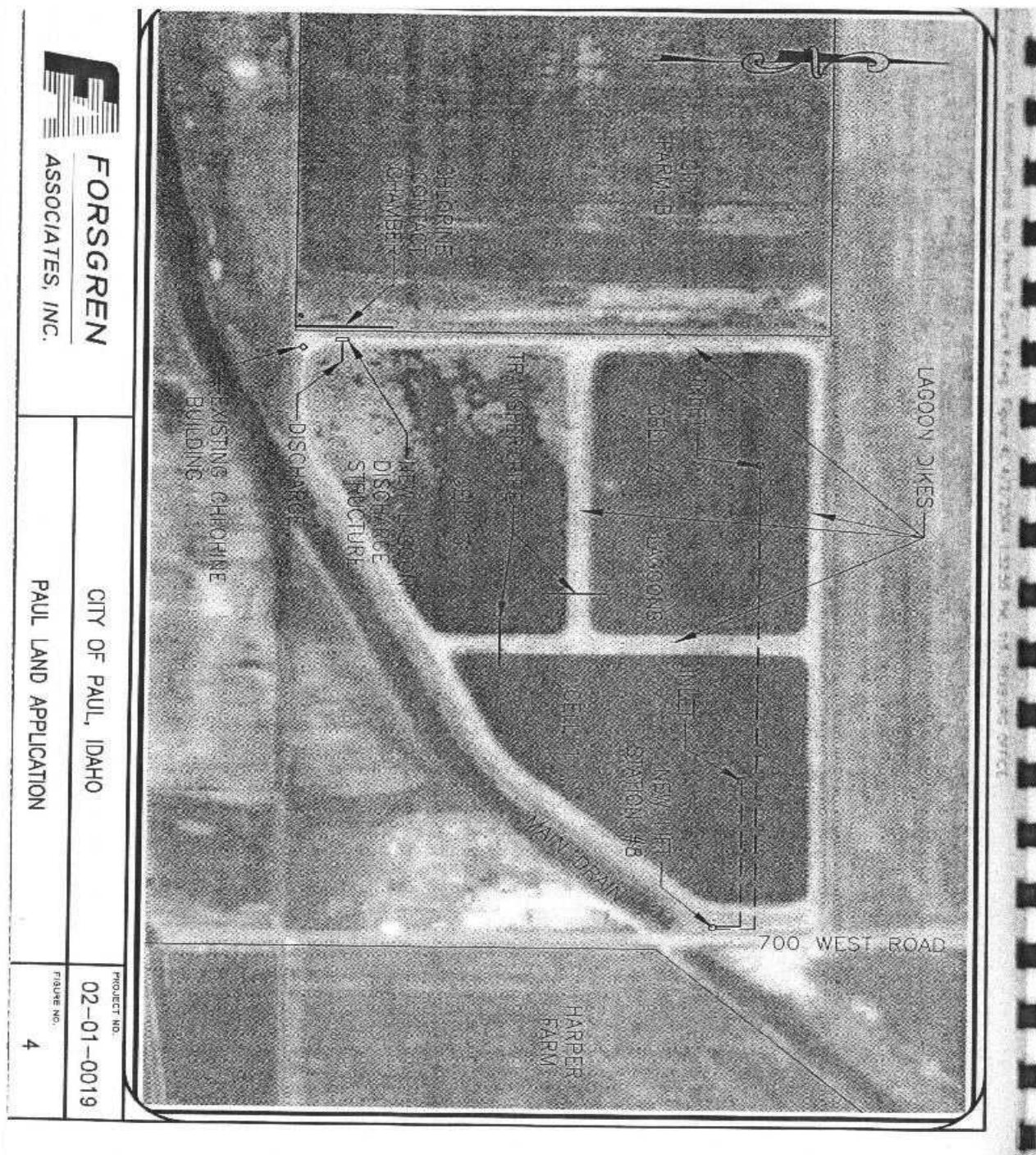


Figure 1. City of Paul Wastewater Treatment Facility Flow Diagram (WLAP 2004).

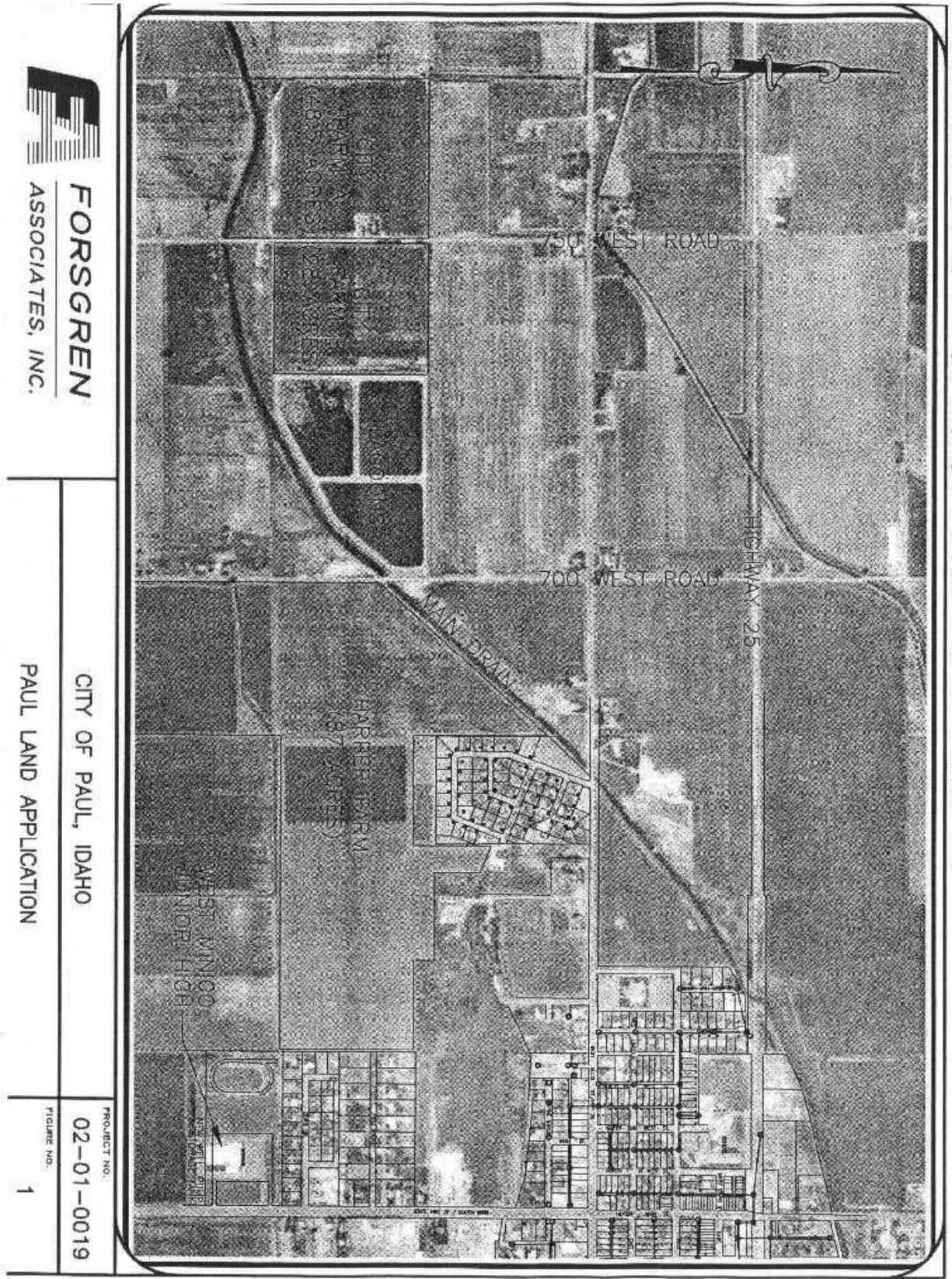


Figure 2. City of Paul Wastewater Facility Location Map (WLAP2004).



Figure 3. Land Application Sites and Approximate Buffer Zone Locations in red.